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## Technology education : is there a need?

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## Technology education : is there a need?

### Abstract

Presents an overview of the need and purpose for the implementation and teaching of technology education. Key points of the successful integration of technology education programs are addressed along with the key components of a successful technology education program. The pros and cons of the modular approach of teaching technology education are also examined. The conclusions are there is a lot of evidence that supports a real need for the teaching of technology education to all students, and modular programs are an integral part of a complete program. The research concludes that a strong creed and vision are crucial to a successful program.

# **TECHNOLOGY EDUCATION: IS THERE A NEED**

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**Department of Curriculum and Instruction**

**in Partial Fulfillment**

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**Master of Arts**

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**by**

**David Bonde**

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This Research Paper by: David Bonde

Title: Technology Education: IS THERE A NEED

Has been approved as meeting the research requirement for the Degree of Masters in Arts  
in Education.

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## CHAPTER ONE

### Introduction

The economic future of our country depends on technology.

Technology educators today are learning to go far beyond the traditional teaching methods used in the past. Students of today should understand modern technological concepts, understand basic principles of technology, be knowledgeable of potential career choices, and be exposed to highly technical curriculum and equipment. These skills are now considered basics, if students are expected to make intelligent decisions in preparation for success in an increasingly diversified and technical labor market.

Technology education is based on experiential learning. Students are encouraged to research, design, engineer, test, and apply devices and systems of technology. Skills such as problem-solving, critical thinking, and decision making are employed to solve practical problems (Gilberti, 1993). A knowledge of the application of science, mathematics, materials, tool manipulation, and the investigation of appropriate technologies and their consequences are important aspects of technology education.

### Research Questions

1. Is there a need and purpose for the teaching of technology education?
2. Are modular technology programs a key component or pitfall of the overall technology program?

### Terms

**Technology Education #1:** A comprehensive, action-based educational program concerned with technical means, their education, utilization, and significance; with industry, its organization, personnel, systems, techniques, resources, and products: and their social/cultural impacts (Kuskie, 1989).

**Technology Education #2:** Technology Education is a discipline of study that is concerned with the systematic application of knowledge, artifacts (tools and materials), and processes to solve the problems of study. The teaching of technology is concerned with the selection, application, and evaluation of technical means to extend human capabilities (Gilberti, 1993).

**Technology #1:** A systematic method of achieving a practical purpose (Puk, 1993).

**Technology #2:** The application of knowledge and use of resources to solve a problem or meet a human need (Wright, 1997).

**Modular Approach to Technology Education (MATE):** a self contained (i.e., "everything" is there for the student) instructional system defined by programmed learning theory, technological devices and equipment. Included are instructional systems ranging from desk top technology trainers and kits to instructional spaces defined by architectural devices and equipment (Petrina, 1993).

**Module:** a lab space where students spend the majority of their classroom time completing the instructional activities. This space is



equipped with all the materials, tools and equipment that students may require to complete the learning activity (Toepfer, 1997).

## CHAPTER TWO

### Literature Review

#### Technology Education

Boser, Palmer and Daugherty (1998) stated "One of the goals of technology education is to promote technological literacy of a broad and encompassing nature" (p. 4). They further suggest that technology education must prepare students to understand, control, and use technology. Dugger (1997) suggests that "Technology should be a required subject for every student at every level" (p. 11). Others stress the need for the teaching of technology. Pullias (1997) states

Technology education can be the one place in the school where students can learn what real problem solving is about. Not only can students become technically literate, they can learn how to use technology and real-world strategies to solve real-world problems." (p. 29)

Zilbert and Mercer (1992) reported that students need the opportunity to learn about technology. This area of study should be a part of the education of all students. Among the most important challenges faced are deciding what to teach young people about technology. Technology deserves direct consideration in every subject taught in school. Surprisingly, technology has no well defined place in the curriculum taught to most students. This condition exists despite the fact that technology is so pervasive and all encompassing that it creates values, sets public policy agendas, shapes

careers, and determines our quality of life. In order to understand modern life, students need to grasp the possibilities and limitations of technology. A major challenge in making the study of technology accessible to students is identifying the concepts which make it a distinct field of knowledge (Zilbert and Mercer, 1992).

### Industrial Arts Education

Lauda and McCrory (1986) suggested that to accomplish the goals of fostering technologically literate citizens who take an active role in the solving of problems that confront society, the curriculum area of industrial arts education has been in a state of reform since the late 1970's. This reform has resulted in a major shift in the conceptual approach of educating students to technology. Where industrial arts once had an emphasis on teaching of material and tool skill related to industry, technology education emphasizes a knowledge and use of the technical means that humans have used throughout recorded history. These technical means may include production, communication, construction, energy and power and transportation.

Many states have adapted a mission for technology education. The International Technology Association is in the process of developing a Goals 2000 program that will unify technology education among states. Puk (1993) suggested that after developing an understanding of technology education it is crucial to have a strong culture developed through a Creed for Technology Education. Puk recommends:

...and goals are for ...

1. Technology Education should be for all students, at all grade levels.
2. Technology Education is not an isolated discipline.
3. All subject areas contain inherent technologies. Thus, the basics of Technology Education already exists in these other subject areas.
4. Technology is more than industrial machines, computers and other physical products; it also involves human processes and environmental ecosystems.
5. In creating technologies, one must always reflect on the relationships between what is intended to be created, the natural environment and other people.
6. All citizens should acquire the knowledge and skills to be both intelligent consumers of technology and doers of technology.
7. For the majority of citizens being "doers of technology" will mean being able to modify and make improvements in their own lives, in the lives of those close to them and perhaps in a wider community, using simple technologies. (p. 27)

As a part of the general education curriculum, the overall objective of technology education is to allow students to become technically literate (Gilberti, 1993). While each state and school has its own set of goals statements for the teaching of technology education, some of the more common goals are for the students to:

1. Evaluate the impact and influences that technology has on society.
2. Interpret the interactions of society and technological systems.
3. Create technological devices and/or solve problems using concepts of creativity, design, and technology.
4. Participate in the improvement of society and the human condition. (Zilbert and Mercer, 1992, p.8)

Ulrich (1992) stressed that the curriculum should be developed completely before the search for activities starts. Community, advisory councils, local businesses and industry should play an important role in this process. Teachers should drive the curriculum not activities. Conroy (1995) credits effective teachers, not equipment and facilities, as the key to a successful technology program. He states

All teachers must develop certain "nontraditional" skills, which will become the "traditional" skills for the twenty-first century. These nontraditional skills will help teachers motivate their students to master the high standards that workplaces in the next century will demand." (p. 23)

Conroy offers the following teaching skills that represent the nontraditional teacher.

- Willingness to use approaches other than traditional instructional methodology - fully integrated technology learning activities, for example and the commitment to training.
- Willingness to work with other teachers to develop and implement integrated curricula that focus on tech prep components.

- Basic knowledge on computers and computer applications, such as word processing (not in-depth MS/DOS or computer programming).
- Willingness to serve in the role of facilitator or manager, rather than "master of the subject," and learning to seek and rely on the expertise of others (p. 23).

Conroy (1995) also lists teaching skills that are specific to technology education teachers.

- Ability to work with others in the Technology Education Center (TEC) and not be possessive of the equipment and facility.
- In-depth knowledge of computer systems, including student and facility management, or the ability to learn.
- Ability and willingness to take training on use and management of new technologies.
- Willingness to take training in developing activities in design problem solving that incorporate SCANS competencies and to train others in their use (p. 23).

### Modular Technology Education

In recent years the use of modular technology has suffered criticism from within the field of industrial technology. Many teachers are finding that the modular programs are limited in their experiences and often lead to a dead end. What most modular labs have done provide an organizational structure that moves students from station to station in a prescribed manner, and leads them through hand-held activities. Pullias

(1997) suggests that by being reluctant to change and not look to the future industrial technology is its own worst enemy. "Accepting the modular concept as a total solution is an example. Technology education is locking itself into obsolescence" ( p. 29). Pullias also states "If modular labs are being considered for implementation, it is mandatory that the mechanism be built in to allow the program to grow beyond modular" (p. 29). Another of the pitfalls of the modular program is poor direction or poor vision on the part of the industrial technology teachers. Often times it is the selling of modules that is the driving force behind the implementation. The primary concern was management and control which is evident in the statement made by Toepfer (1997)

Most sales men started with a thorough explanation of how the system worked and how well the classroom could be controlled with every child at a desk, monitored by a teacher at a computer console, kept on task with up-to-the-minute software-generated reports."

(p. 28)

It is true that the modular program when used inappropriately can appear to be an ineffective system. In Wright's (1997) article he highlights the elements to having a successful modular program. Instead of blindly accepting the modular philosophy, one should ask what purpose do modules serve in the overall program. Wright (1997) states

It seems obvious that modules present one way to structure and deliver the knowing, doing, and valuing aspects of the curriculum

**... Modules, along with other ways to present the curriculum, should be evaluated on their ability to provide appropriate opportunities for students to develop technological proficiencies" (p. 5).**

**When implemented correctly modular programs are a key component to a complete and successful technology program.**



## CHAPTER THREE

### Conclusion

The need and purpose for technology education in our schools is clear. Technology education must prepare our students to enter a highly technical and every changing work place. A strong philosophy and culture in technology education can provide a solid foundation to build a strong program. With clear goals and purpose, the transformation from industrial arts to technology education has made great strides to meet the needs of students. Modular programs are an important part of the technology education curriculum but they must be infused into a holistic and complete program. During the exposure phase of technology education the modular program has no equal. The ability to get students hands on experiences with a variety of highly technical equipment is best done by the use of a modular program. Unfortunately, some industrial technology teachers are enticed by the sales pitch that a modular program is a "be all" program, it is not. When the entire program is focused on or around the modular approach many key components of a good technology program are missed and thus become an easy target for critics.

Other major changes in schools such as "school-to-work" and "tech prep" have reinforced the importance of introducing students to technology and technologically oriented occupations. While technology education has an important and unique role in schools it does not function in isolation. Technology education is a part of many systemic changes occurring

throughout education made to meet the needs of today's students.

Technology has a major presence in the outcomes students must poses to be a complete graduate ready to contribute to society. Regardless of the instructional approach utilized, the purpose of technology education is to prepare students to become technologically literate citizens.

*Continued on next page*

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